

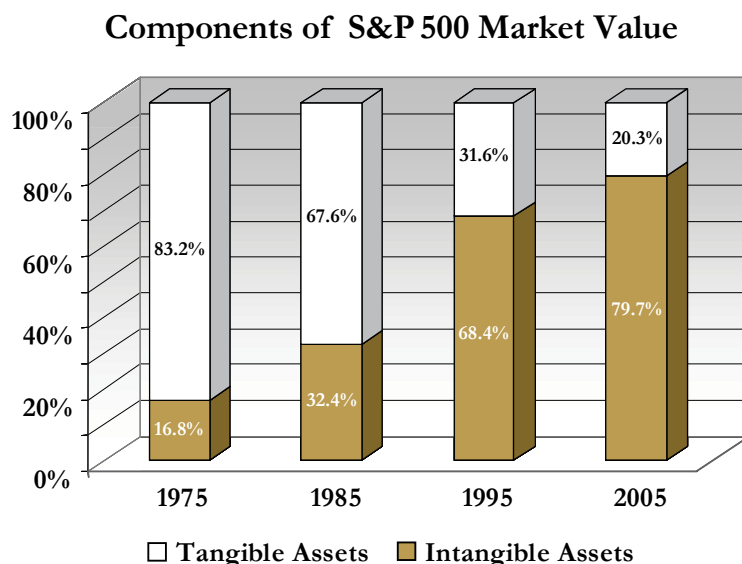
INNOVATION MEASUREMENT: THE ECONOMIC IMPACT OF PATENT VALUE

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The Department of Commerce is seeking public comment on issues related to the measurement of innovation. This request supports efforts of the *Measuring Innovation in the 21st Century Economy Advisory Committee* to seek advice from the public as it prepares recommendations for the Secretary of Commerce on new or improved measures of business innovation. The comments provided herein are contributed by Ocean Tomo, LLC and Ocean Tomo Federal Services, LLC (together, “Ocean Tomo”). Ocean Tomo is a provider of diversified intellectual property-related services.

Innovation is the design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm. The current breakdown is that most of the statistical measurements that are used to measure innovation are based upon the historical labor and industrial economy of the United States was in and have not adapted to the current knowledge economy of the United States.

As the U.S. economy has transformed from a manufacturing base to a service base driven by knowledge and innovation, intellectual capital has emerged as a leading asset class. The term intellectual capital refers generally to the value of a company’s intangible assets, including those assets traditionally referred to as intellectual property – patents, trademarks and copyrights. During the transformation, the portion of company value residing in intangible and tangible assets has reversed. As shown below, intangible value as a percentage of market value has grown from 16.8% in 1975, to 32.4% in 1985, to 68.4% in 1995, and to 79.7% in 2005.



Source: Ned Davis Research

FIGURE 1

To better understand this economic inversion and the relative contribution of intangible and tangible assets to innovation, economy-wide and sector-specific statistical indicators measures of intangible assets are needed.

One embodiment of innovation is patents -- but innovation cannot be measured by a simple patent count. Stated directly, patents are the single most fundamental measure of innovation but only recently has the private sector developed sufficient metrics to support the inclusion of patent quality and value measurements as a relevant statistic. We have heard the cries that the US manufacturing base has moved to Asia and our service economy is moving rapidly to India. What is left? What is left is proprietary innovation – inventions protected by intellectual property

laws. Without the protection of intellectual property laws, the economic returns necessary to justify the investment in innovation disappear. Over time, the authors believe that in addition to patents, trademarks and copyrights may be accessible to consistent measurement frameworks developed by Ocean Tomo and others.

DESCRIPTION OF PROPOSAL

Specific Description of the Proposed Change

Ocean Tomo proposes that the Department of Commerce track Patent Quality and Value Measurements (“PQVM”) as way to measure innovation. By creating a series of appropriate economy-wide and sector-specific statistical indices based upon the value of patents, the Department of Commerce will be able to quantify innovation and its impacts. The bases for this recommendation include:

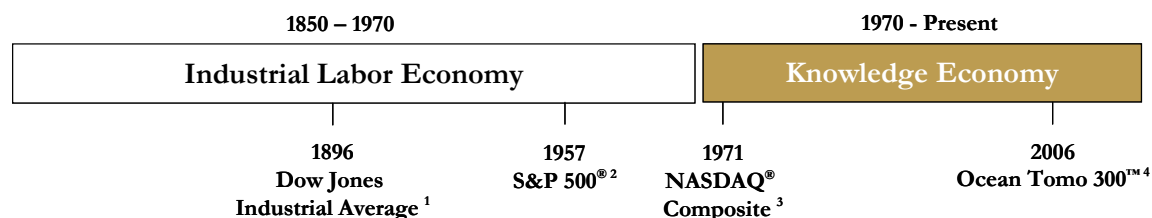
- Patents are constitutionally protected.
- Patents are a long-standing and understood means for firms to assess the effectiveness of their own innovative activities.
- PQVM allow for analysis at industry, sector, national, and international levels.
- PQVM allow for both broad economy-wide and sector-specific statistical series as well as extremely granular measures of innovation and productivity.
- PQVM allow for identification of firm-specific data items that could enable comparisons and aggregation.
- Statistical algorithms that may be used to create PQVM data allow for identification of specific “holes” in the current data collection system that limit our ability to measure innovation. Such tools also allow for estimates of the missing data.
- PQVM data allow measurement of the flow of innovations across firms and sectors.
- PQVM data distinguish between types of innovation (*i.e.* radical versus incremental).
- Patents lie at the heart of how firms introduce new products and services to the market.
- PQVM data can be correlated against data items from SEC filings to enhance understanding of innovation in public companies.
- PQVM data can be compared to stock market information to measure relative innovative success (e.g. percent of total growth or value attributable to new—or improved significantly enough to be considered new—products, services, or processes introduced into markets where a firm has a growing market share) that would provide insight into relative innovative strength. The data can be measured for any period of time.
- Efforts are underway to create PQVM data or its equivalent in foreign markets, allowing a better measure of comparative innovation on a global basis.

The authors request that the Department of Commerce recommend to The Conference Board that the Ocean Tomo 300™ Patent Index be included as a leading economic indicator alongside the S&P 500 index.

The authors request that PQVM such as the Patent Technology Basket™ be used as a statistical index to measure the economy-wide and sector-specific impact of innovation.

Ocean Tomo 300™ Patent Index

Ocean Tomo, LLC (“Ocean Tomo”), in partnership with the American Stock Exchange, recently announced three patent-based indexes, the Ocean Tomo 300™ Patent Index (AMEX: OTPAT), the Ocean Tomo 300™ Patent Growth Index (AMEX: OTPATG) and the Ocean Tomo 300™ Patent Value Index (AMEX: OTPATV). Related IP-based indexes are scheduled to be released in the future. The American Stock Exchange recognized the Ocean Tomo 300™ Patent Index as “the first major, broad-based market equity index to be launched in 35 years, and follows the progression from the Dow Jones Industrial Average in 1896, to the Standard & Poor’s 500 in 1957 and then to the NASDAQ Composite Index in 1971.”



1. Tracks only 30 companies.
2. Tracks only the largest companies.
3. Tracks only NASDAQ listed issues.
4. True measure of the knowledge economy across all capitalizations, styles and sectors.

FIGURE 2

The Ocean Tomo 300™ Patent Index is based on the 300 companies with the best patent portfolios, as assessed by Ocean Tomo, relative to their tangible book value. Prior to Ocean Tomo's PatentRatings® system, it was effectively impossible to reliably and reproducibly value a company's intellectual property. The use of the Ocean Tomo PatentRatings system and the Index constituent selection process together make the Ocean Tomo 300™ Patent Index an effective and reliable measure of the economy-wide impact of innovation. Although relative performance is secondary to our recommendation that the Index be an economic indicator, the strong comparative performance shown below does reinforce the relevance of the Index as a measure of economic growth and innovation.

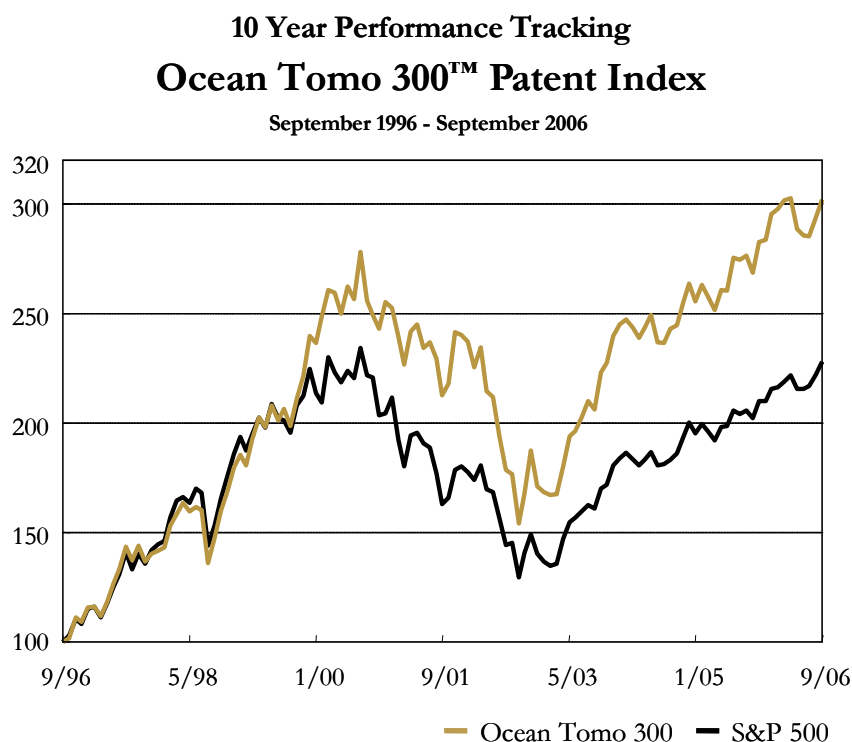


FIGURE 3

The development of the Index began with a six month research study conducted with Ned Davis Research (NDR). Ocean Tomo's PatentRatings system identified and mapped ownership for nearly 600,000 patents to more than 4,200 listed companies, and produced a number of patent metrics on these companies for 40 quarters, ending with the second quarter of 2005. These patent metrics provide a consistent and objective framework by which the

economic impact of patent portfolios can be reproducibly and reliably measured. The underlying metrics can be grouped to obtain impact metrics for innovation at the economy-wide level, at the sector level, at the technology / patent class level, or at the firm level. In this way a robust and comprehensive family of indicators can be generated ensuring consistency and reliability as an ensemble.

One group of the metrics reflects core patent statistics, such as the number of in-force U.S. utility patents owned, the average age of these in-force patents, and the number of patents abandoned. Other metrics measure patent quality by employing forward citation analysis for patents owned by each company. Also calculated are patent metrics that reflect trends in a company's patents relevant to the health of its patent portfolio, e.g. an overall obsolescence or decay rate for each company's patent portfolio. Another metric measures the technological concentration or diversification of each company's patent portfolio. Further detail is provided later herein.

Patent Technology Baskets

Using the same underlying data from the US Patent Office that was compared to stock market values above, PQVM can be developed for the entire US patent system ("Patent Value Index™), a narrow or broad technology class or for a given patent or set of patents. The authors believe that such measures are meaningful indications of innovation meeting virtually all of the Committee's requests. Patent Technology Basket data may be viewed as shown below:

Patent Indexes

Index	Close	Change	
		Week	2007
Clymr/OT Patent (OIP)	27.17	0.3	0.5
Clymr/OT Growth (OTR)	26.57	0.1	0.2
Patent Value Index™ ¹	1,102.22	-0.3	0.2

¹ The Patent Value Index™ represents the maintenance value of all current US patents using the same metric underlying the Ocean Tomo 300® Patent Index.

Patent Technology Baskets

Measure represents the maintenance value of patents in a specific technology sector.

Technology Basket	Close	Change	
		Week	2007
Oil/Gas Extraction	1,022.33	0.2	-0.2
Mining	993.23	0.9	0.1
Food Manufacturing	1,102.22	-0.3	0.2
Petroleum/Coal Man.	978.34	0.9	1.2
Plastics/Rubber Man.	1,102.35	1.4	-2.1
Computer/Electronic Man.	989.21	-3.2	1.2
ISPs, Web/Data Svcs	943.95	4.3	2.1
Testing Laboratories	899.92	-.01	1.1
Waste Management	1,302.74	-1.1	0.5
Gambling Industries	1,019.78	2.5	-0.1

Amounts calculated weekly from all patents in the relevant class. Historical data may be found at www.oceantomo.com/baskets.

FIGURE 4

Committee Category to which the Proposal Applies

This proposal addresses each Category requested by the Committee. Category 1 is addressed by the sector-based data above. Category 2 is addressed by both Patent Technology Baskets and patent-based market indexes. Category

3 is accessible though the underlying data used to compute both Patent Technology Baskets and patent indexes. This proposal generally addresses Category 4 by providing data on intangible asset value not currently addressed in either FASB or SEC reporting.

Rationale for the Proposed Change

The economic inversion reflected by Figure 1 represents perhaps the largest single macro-economic impact on the U.S. economy in the last quarter century. This change is permanent and its reflection is wholly lacking in current accounting and securities reporting. It signals a fundamental shift in the role innovation plays in the economy. Simply put, innovation is no longer limited to a supporting role in value creation, in many cases it is the product itself.

The recommendations of the authors uniquely address this obvious informational gap. The proposed recommendations also meet each of the Committees targets regarding:

- Analysis at industry, sector, national, and international levels
- Broad economy-wide and sector-specific statistical series
- Extremely granular measures of innovation and productivity
- Firm-specific data items that could enable comparisons and aggregation
- Measurement of the flow of innovations across firms and sectors
- Distinguishing between types of innovation (*i.e.* radical versus incremental).

Most importantly, the proposed Index measurements are based on existing data sets, are already accepted by the market and form the basis for investment decisions.

Data Description, Sources and Method of Collection

The data used to generate the recommended metrics is already publicly available without further cost from the US Patent & Trademark Office and common sources of stock market data. The data may be collected directly by each individual user and is available in aggregate from a number of private firms. Ocean Tomo's previous offer to the US PTO to make the data and certain of its metrics generally available on reasonable and non-discriminatory terms remains open.

Approximate Cost and Burden Estimate

Given the use of current databases and multiple aggregators of the underlying information needed to support the proposed metrics, no significant additional cost is foreseen.

IMPACT OF PROPOSAL ON INNOVATION

How Proposal Improves Measurement of Innovation

Many of the benefits of the proposed measures are discussed above. Importantly, patents are a long-standing and understood means for firms to assess the effectiveness of their own innovative activities. For public reporting purposes or industry-based analysis, the proposed measures are the only known, objective metrics for intangible asset value and contribution to value.

Elements of Innovation Measurement that are Improved by the Proposal

See above.

Answers to Specific Issues and Questions Raised by the Committee

Are there measures that accommodate economy-wide (or macro-economic) and sector-specific notions of innovation? Yes, Patent Technology Baskets accomplish both. The Ocean Tomo 300 Patent Index is an economy-wide measure by design but similar industry-based indexes may be easily developed.

What elements of innovation could serve as a foundation for statistical series? Patent statistical data provides the foundation for the data series. See detailed discussion below on the PatentRatings® System.

To what extent would the collection of better data on service sector outputs and services inputs used by all firms improve innovation measurement? The recommended data could be used for a variety of purposes including measuring returns on research and development and investment. The data will also be used to create market-based means to finance, and manage risk for, further innovation. Further details on developing efforts in this regard may be found at www.IPXChicago.com.

Is market share growth a good indicator of innovation? Yes. Notably, patents contribute more directly to market share growth than any other measure as they provide a government-granted limited monopoly with protected market share as one intended benefit.

If so, would estimates in the change in U.S. firms' shares of regional, national, and global markets be useful innovation measures? Yes. See above. Patent data allows for distinguishing between U.S. and foreign innovators as both U.S. and international firms are active applicants for, and recipients of, U.S. patents.

Could/should collaborative connections between entities be captured? Yes, patent citation between innovators directly shows such collaboration on a company, industry and national level. Further detail on this question is provided through the examples of patent mapping contained later herein.

Since a characteristic of markets is that the benefits of innovations flow, at least in part, to buyers, are there ways to identify the flow of innovations across firms and sectors? Yes. Patent assignment data directly tracks this flow. Interestingly, the market for such transfer is currently developing through both a traditional auction format (see www.OceanTomoAuctions.com) and the Intellectual Property Exchange Chicago referenced above (www.IPXChicago.com).

Description of how PQVM Signals Changes are Important to Policy Debates

Changes in PQVM signals in specific sectors are leading indicators of investment and market demand. From a policy point of view they are uniquely helpful to address the issue of patent quality in the US. They may also be

used for accounting reporting such as purchase price allocation and FASB 141 and 142 compliance. Once comparable data sets are developed internationally, PQVM data will allow for better accounting measures related to global transfer pricing and technology cross licensing. The authors are available to discuss these and related policy issues in further detail.

UNDERLYING PATENT DATA VALUE ANALYSIS

Overview

The Ocean Tomo PatentRatings® system is a patented algorithm (See: US6556992) which measures the relative value of patent portfolios by employing sophisticated statistical techniques based on patent survival analysis. This analysis is distilled into an intellectual property quotient, or IPQ Score, which reflects the probability that a patent will be maintained or abandoned. IPQ Scores function like FICO risk scores do for consumer credit. A patent's IPQ Score can be converted into an implicit patent value expectation, allowing for the straightforward calculation of the relative value of a company's patent portfolio on a weekly basis. A wealth of additional useful information can be derived from USPTO maintenance records by determining and exploiting statistical correlations between patent maintenance rates and certain objective attributes or "metrics" revealed by the patent, its file history and/or other associated public records.

A double-blind study conducted in cooperation with a major Fortune 100 company demonstrates that IPQ scores are predictive of patent commercialization rates. A sample of approximately 200 patents was provided, roughly half of which had produced significant economic benefit (licensed or commercialized) and roughly half of which had produced no known economic benefit (non-licensed, non-commercialized). All of the patents were rated according to the statistical regression model described above and scores were ranked by decile from highest to lowest. Of the patents ranked in the top decile, roughly 83% were from the licensed/commercialized group. Of the patents ranked in the two lowest deciles none were from the licensed/commercialized group.

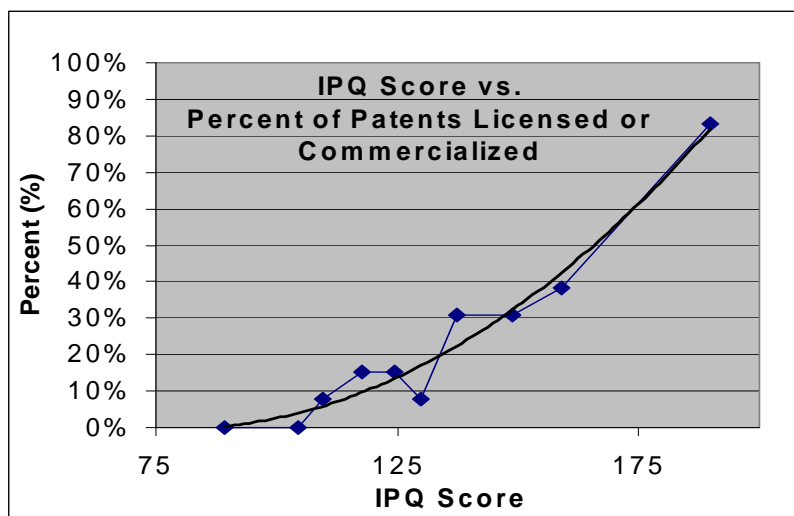


FIGURE 5: Correlation between IPQ Score and Patent Commercialization Rate

These results suggest that statistical patent benchmarking may be especially useful to help identify top-tier patents that with the highest expected value and licensing potential. Study results are summarized by the graph in Figure 5 above.

NDR applied a regression analysis to ten years of data spanning 1995-2005 in order to assess the relationship between the patent metrics supplied by Ocean Tomo's PatentRatings system and stock market returns. NDR first removed sector bias from the results obtained by the PatentRatings system by normalizing the patent value for each stock. NDR's regression analysis of these patent factors produced coefficients representing the market return ascribed to each factor, holding all else constant. When plotted against time, a coefficient with a consistent, upward trend indicates that the corresponding factor is a reasonable predictor of stock market returns. The following summarizes these important findings.

Patent Factor	Mean Return	Std. Dev.	Ratio	Comments
Patent Value/Book Value	0.70	1.36	0.51	Consistent upward trend
Patent Value	0.26	0.80	0.33	Strong consistent upward trend
Patent Value/R&D	0.35	1.27	0.28	Inconsistent pattern; relatively flat since 2002
Patent Exchange Value	0.21	0.80	0.26	Strong consistent upward trend since 1998
Change in Patent Count	0.15	0.65	0.23	Consistent upward trend
Average IPQ SCORE	0.25	1.22	0.20	Inconsistent pattern; negative return to factor since 2003
Abandoned	0.21	1.07	0.20	Strong consistent upward trend
Patent Velocity	0.13	0.73	0.18	Consistent upward trend; not as strong as other factors
Std. Dev. of IPQ SCORE	0.15	0.87	0.17	Inconsistent trend; negative return to factor since 2001
New Forward Cites	0.11	0.75	0.15	Inconsistent trend
Patent Count	0.10	0.75	0.13	Inconsistent trend
Total Forward Cites	0.07	0.66	0.11	Inconsistent pattern; negative return to factor since 2004
Diversification	0.06	1.04	0.06	Inconsistent pattern; negative return to factor since 2004
Patent Age	0.01	0.89	0.01	Inconsistent trend; negative return to factor since 2003
Decay Rate	-0.10	1.56	-0.06	Large negative return to factor in 1999; inconsistent trend
Patent Flow	-0.10	0.87	-0.11	Negative return to factor until 2004; positive since 2004

FIGURE 6

On average, a 10% increase in the value of a company's innovation ratio, defined as the ratio of a company's patent value to its book value, leads to a 7% increase in its stock price. Building on these findings, the Ocean Tomo 300™ Patent Index reflects the economy-wide impact of innovation by identifying six companies within each of 50 defined groups of size and style (e.g., value, relative value, blend, growth at a reasonable price, and growth by decile) with the highest innovation ratios (i.e. the ratio of patent value as determined by Ocean Tomo's PatentRatings system, to book value).

The Ocean Tomo 300 Patent Index outperformed every major broad-based index for the last ten years. It outperformed the NASDAQ Composite by 400 basis points annualized, the S&P 500 by 300 basis points annualized, and the DJIA by 250 basis points annualized. This performance was achieved with similar risk characteristics to the S&P 500 with a beta of 1 and a similar standard deviation. The Ocean Tomo 300 Patent Index consistently outperformed the S&P 500 in 82 out of 85 rolling three year periods and it outperformed the S&P 500 in both up and down markets.

Patent Clustering and Mapping

Ocean Tomo has developed a proprietary PatentMapping™ tool that creates an interactive map of an entire technology space, including all relevant patents and published patent applications within that space. Maps are

generated using relational citation analysis and are independent of USPTO class/subclass designations, IPC classifications and language ambiguities. By relying on relational citation analysis, Ocean Tomo's PatentMapping™ tool is immune from problems associated with arbitrary semantic rules-based analysis. Patents can be further characterized, ranked or sorted by class/subclass, assignee, priority date and/or IPQ using standard SQL queries. An example of the map output is shown below.

PATENT MAPPING

PatentRatings has developed a key new capability to show interactive patent maps using mapping software. The mapping technology displays the entire patent universe in a browser-interface, allowing point-and-click examination and analysis of an entire patent space. We can map not only issued US patents, but all cited foreign patents and all US published applications and cited non-patent prior art.

*IDENTIFY
COMPETITIVE
STRENGTHS OR
WEAKNESSES IN
YOUR COMPANY'S
PATENT SPACE*

*TARGET
FOR SALE,
DEVELOPMENT,
DEFENSE,
LICENSING,
OR INNOVATION*

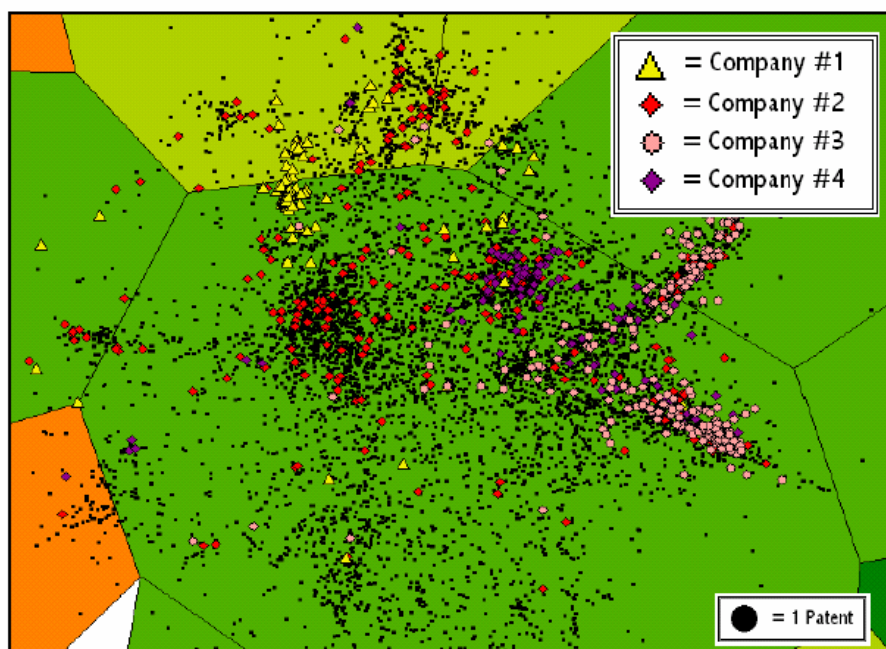


FIGURE 7: Patent Mapping

Ocean Tomo's PatentMapping™ tool provides a powerful analytical method by which technology spaces can be visualized, permitting a new generation of innovation indicators to be reliably and reproducibly created.

Maintenance Value

Ocean Tomo Maintenance Value or OTMV™ is a statistically derived expectation of value from the perspective of a hypothetical reasonable patent holder. A value probability model is developed based on a Monte Carlo analysis of implicit underlying patent values and corresponding observed maintenance/mortality data. Specifically, the model is formulated and optimized to estimate the set of value probability conditions and value distribution assumptions that necessarily or implicitly must exist in the minds of patent holders to rationally account for actual observed patent maintenance behavior. A final model is selected based on an iteratively determined solution that best fits predicted underlying patent values to actual observed maintenance and mortality data.

Patent Technology Baskets

Patent Technology Baskets use Ocean Tomo's PatentRatings system to provide indexes tracking specific technology sectors. Ocean Tomo's PatentMapping™ tool permits reproducible and reliable measures of relevancy between

patents without relying on arbitrary semantic-based rules, providing a powerful and robust method by which the essential patents underlying a technology sector can be defined and monitored. The basket's reported metric is the cumulative maintenance values, the OTMVs described above, of the underlying patents in the basket. Over time, the constituent patents may change as newly issued patents are included and older patents expire.

Patent Technology Baskets provide a direct and easily tailored measure of the economic impact of innovation by sector. The methodology employed to define and measure the economic impact of the innovation captured in the Patent Technology Baskets makes its broadly applicable to any sector – the methodology applies regardless of the definition of sector used for the analysis. Patent Technology Baskets do not require additional data to be collected, nor is the resulting measure of sector-specific innovation impact indirect or inferred from aggregated data.

Patent Technology Baskets and other applications of Ocean Tomo's PatentRatings system and PatentMapping™ tool can be used to address innovation measurement needs in the U.S. System of National Accounts, firm-specific data needs and remedies for "holes" in the current data. The use of OTMVs, grouped according to sector, firm, or other dimensions, can provide output measurements or proxies for use in the R&D Satellite Account. Ocean Tomo's patent analytics provide unique opportunities to characterize and measure firm-specific innovation, i.e. changes in a firm's market share of a technology space might be used to provide a consistent comparative framework measuring corporate innovation. Additionally, Ocean Tomo's patent analytics can provide reliable and reproducible measures supplementing SEC filings with proxies for innovative impact. Ocean Tomo's patent analytics create reproducible and reliable measures of innovation impact with diverse applications in both establishing innovation metrics informing policymakers and supplying easily implemented systems by which firms may better assess the effectiveness of their own innovative activities.

Closing

The cumulative value of all patents can accommodate the measurement of an economy-wide notion of innovation and the value of all patents within a sector can accommodate a sector-specific notion of innovation. Patent Quality Value Measures serve as a foundation for statistical series concerning innovation. PQVM are the single most meaningful and relevant benchmark of innovation in the knowledge economy.

The authors request that the Department of Commerce recommend to The Conference Board that the Ocean Tomo 300™ Patent Index be included as a leading economic indicator along side the S&P 500 index.

The authors request that PQVM such as Patent Technology Basket™ measures be used as a statistical index to measure economy wide and sector specific innovation.

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